WHAT ARE THE AVERAGE LEARNING GAINS AND PUPIL GROWTH ATTRIBUTABLE TO TEACHING A CURRICULUM BASED ON STATE STANDARDS IN THE 6TH GRADE TECHNOLOGY EDUCATION CLASSES AT SHATTUCK MIDDLE SCHOOL

by

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ABSTRACT

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What are the average learning gains and pupil growth attributable to teaching a curriculum based on state standards in the 6th grade Technology Education classes at Shattuck Middle School.

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The purpose of the study was to find out the extent to which the existing curriculum and teaching strategies being followed in the sixth grade at Shattuck Middle School meet the State Academic Standards and objectives for technology education. The main objective of the study was to quantify the amount of learning that took place in regard to the standards after an introductory quarter year class of technology education. A 10 question multiple choice test was designed against the state technology education standards. Students were assessed using a pre-post test design. The Index of Pupil Growth (IPG) was used as the metric of analysis. This metric has a value from –100 to +100%. An achievement of learning gain through the use of the IPG of 10% or better is considered to be satisfactory. Across the six classes the average IPG was 16.94% and ranged from 3.91 to 36.60%. When applying the 10% standard to individual student performance 46%to 76% of the students in each class section were

meeting the standard. Overall 57% of the students met or exceeded the standard. From the results it appears that the curriculum and instructional methods being followed are adequately meeting the needs of the majority of students. Recommendations on how these results can be used to improve student and teacher performance are offered as well as the issues related to assessing student performance.

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Chapter I. INTRODUCTION

The purpose of the study is to find out the extent to which the existing curriculum and teaching strategies allow students in sixth grade at Shattuck Middle School to meet the State Academic Standards, and objectives in Technology Education. The main objective of the study will be to quantify the amount of learning which takes place because of what and how things are done in that classroom. Assessment and accountability are important to any novice instructor, whose long-term goals must include continual improvement and results from a curriculum that is ever changing.

As the twenty-first century begins, and the old one comes to a close. The American Education System is hearing a call for reforms that would force accountability and an increase in results. This call can be heard in the local, state, and national media throughout this country. It is also being heard this election year from political candidates and parents.

Reasons for this request of a call to action are widespread and varied. From the broadest scope inward the problem is widest spread when looked at from a global aspect. When academic achievement is looked at worldwide it is usually measured through testing. Students in this country are not doing as well on these tests when compared to their counterparts in nearly all other countries of the world. Millman (1997 p. 169)…emphasizes this fact.

> U.S. achievement test scores in foreign languages, mathematics, and science have long lagged behind those of many industrialized countries.

Most research on the subject points to a lack of motivation in students in this country, because so little is really expected of so many. This is brought to light by Tucker and Codding (1998 p. 38)… with the example of Jeff.

> The ones, like Jeff, who choose to stay in high school beyond the age of sixteen know that they can go from high school to community college and many four-year colleges with only a high school diploma. Since they already have the level of literacy needed to get the diploma, the only other requirement to get their diploma is to show up most of the time and stay out of trouble. They would be foolish to take a tough course or study hard: they might fail a tough course, and studying hard for an easy course would buy them nothing, since neither the employer nor the nonselective college is particularly interested in their grades as long as they have the diploma.

Motivation seems to be the missing key ingredient for many middle to lower level students. If American students are to compete in the global economy of today and beyond, they must be equipped with the necessary skills. Tucker

and Codding (1998 p. 38)…find that motivation problems can and do lead to performance problems.

> It is hardly clear how the performance of American students can meet or exceed the performance of Asian and European youngsters when they leave high school if their students are highly motivated to achieve and ours are not.

These underachieving students seem to be like prisoners of a system which enables them to commit only time to the education they should be busy building. In some of the worst cases, students even view the school they attend to be very much like a prison. The reasoning involved here is that they are usually told when and what to do. Freedom and creativity seem to have been traded for conformity and safety in a drab, colorless institutional setting where they are overworked, bored, and lack control. Millman (1997 p. 112)…also speaks of the counter argument.

> The counter argument is that learning standards, expectations, and consequences are dangerously weak in many schools today, constituting both a cause and an effect of student disengagement from school (see Steinberg, 1996, for one such argument).

Doing time needs to become transformed into making every minute count through better time management resulting in continual academic improvement. Rather than just waiting at the door for the next bell to ring, leading to another, and eventually freedom or at least favorable choices. Students should instead be focused on the goals and standards which will lead them to the academic achievement skills and abilities needed to compete, and get results. Millman (1997 p. 180)…feels that, "regardless of one's position on the philosophical spectrum, few, if any, would disagree with the assertion that sustained academic growth for students of all ability and achievement levels is the primary goal of formal education."

Grouping children according to ability or disability may be sending the wrong message when it comes to academic expectations. Children understand early on that if expectations are low, then effort will be allowed to reflect these low levels. Labeling can also have a lowering effect on expectations in that students are focussed and grouped by negative disabilities, when positive abilities may be what should be emphasized instead. Tucker and Codding (1998 p. 34)…find no benefits to grouping, and compares what parts of Europe already believe and practice.

> In much of northern Europe, it is illegal to group children by ability until they are at least fourteen years old, and in other countries it is simply not done.

Yet another portion of the problem lies in the fact that most forms of public education are performed in overcrowded schools, where quantity is emphasized over quality in most cases. Children asking questions often know they will be holding back the progress of the rest of the class. They won't risk it to show a lack of understanding, fostered by peer pressure, this can increase with the age of the child. But the largest portion of blame lies with the textbook publishing companies. In competition with one another, they try to see who can cover the most material while sacrificing any chance of breaking down difficult to understand concepts into smaller more understandable components. Again, quality is surrendered for the sake of quantity, profit over academic achievement. Tucker and Codding (1998 p. 75)…break down even more reasons for the problems in education today.

> In the something-for-everyone sorting world of the century now coming to a close, the emphasis was on what was taught, not what was learned; on coverage, not mastery; on remembering for the test, not learning for the long haul; on gaining students' interest, not educating for rigor.

The future in education will contain high standards, which can be hard to put in a form which is both measurable for educators, and understandable for students. Students will need to demonstrate proficiency in skills before moving on to the next skill, concept, or grade. Tucker and Codding (1998 p. 77)…

> The best way for this country to reverse that course is to set a high standard that is the same everywhere and for everyone and make it clear to all but the most severely handicapped that they are expected by all the adults in their lives to reach that standard. Period.

Teachers can make an enormous difference to students of all levels. But this can truly be a make or break situation for students who lack motivation, especially very early in their academic lives. In some cases it may not even matter what the teacher does, but how they do it, or are even perceived by students that may make the most difference. Airasian and Gullickson (1997)…

> The effective teacher ignites enthusiasm, responsibility, curiosity, and creativity in students and guides them to become accomplished, self directed learners and productive citizens.

When educators are able to awaken students to the potential of their Abilities, it can have both widespread and long-term effects on everyone involved. Motivation may be one of the most important things a teacher can bring out in students, while being totally unaware it is even happening at all. This is the goal that is all too often just out of reach or sight for those who may need it most. Eisner (1985)…

> What we want education as a process to accomplish is not merely to change students, but to improve the quality of their lives.

Stakeholders in education, but to a greater extent public education, include everyone within our communities. These individuals want our students to learn and gain the most basic of skills to contribute to our diverse society. And they want proof in kind that these results are actually taking place and not just preached. Millman (1997)…

> Student learning is the only defensible objective for the public schools in their current configuration.

As we will discuss later, teachers, and the unions which represent them, have been reluctant to support most Assessment and Evaluation proposals mainly on the grounds of fairness and equity. Control may also be a secondary issue. Millman (1997)…

> It is contentious because teachers are keenly aware of the contextual dependence of pupil learning and resist pressures to be held accountable when they are not able to control all factors affecting it. Educators want a level playing field and do not believe such a thing is possible.

This is not to say that most schools are not trying to improve instruction with an eye on results. They are, in many cases. But the problem with public schools is much the same as with any large corporation. Any time you have a large number of employees performing the same service task, it can be extremely difficult to determine whose performing well, and who is not. In these cases, pay and rewards are too often given for tenure and knowledge, instead of performance and talent. Eisner (1985)…

> The once-per-year visit of the principal to the teacher's classroom is primarily intended to meet the requirements for determining tenure, rather than something that one colleague does to be helpful to another.

However, Educational Evaluation and Assessment can be a very constructive tool, to help all parties involved. Constructive criticism can lead to improvements in any number of areas. Eisner (1985)…

> When an educational critic appraises in a way which is designed to provide constructive feedback to the teacher, evaluation begins to perform it's most important function: providing the conditions that lead to the improvement of the educational process.

The education field has, and will continue to be in search for a successful way to not only evaluate, but reward those teachers who get results. But most of

all they could be rewarded for even the amount of results that they are responsible for producing.

Chapter II. Review of Literature

The literature review will discuss various aspects of measurement that need to be taken into consideration when evaluating the outcomes of teaching and also provide some models to follow in evaluating instruction. According to Popham (1988 p. 118-119)… the basic measurement features to consider for any assessment device include reliability, validity, and usability.

> Reliability refers to the consistency with which a measure assesses whatever it is measuring. In contrast to validity, which focuses on whether a test yields scores from which valid inferences can be drawn, reliability merely reflects the consistency of the measuring device. Usability deals with the ease with which a test can be administered, while stability is over time or separate occasions. (Popham, 1988, p. 118-119)

Evaluation

There can be many uses for the information gathered by an accurate and effective evaluation. This information is most often used to supplement a vast supply of already known facts concerning educational decisions. These decisions can and usually do have a lasting effect on all the stakeholders of any given community searching for changes and or improvement. According to Eisner (1985):

> evaluation as a process can perform many different functions in education: it can reward, it can screen, it can select, it can at times help us determine if our objectives have been achieved.

The process of evaluation is a difficult one. School administrators would like to find a way to evaluate all teachers fairly in all subjects or disciplines. The dilemma is that certain teachers would be at a disadvantage compared to others because of the subject they teach, and or the students they teach. Millman (1997 p. 102) points out that certain student populations are more difficult to educate, than others. High track students almost teach themselves while the slower students need higher levels of teaching skills in order to achieve educational gains. The challenge is to create a "level playing field".

If teachers are to be rewarded for the results they facilitate, then there must be a fair way to assess what it is that they produced. That would then allow them to better understand what it is that is creating the positive results or improvement. It would also verify and quantify accountability for everyone involved. "The establishment of a responsible link between teacher performance and student learning is essential to effective schooling." (Millman, 1997, p. 14)

While most people feel that some teachers continue to be better at teaching than others they would be hard pressed to define or even explain what it is that is the cause of this disparity found in two otherwise comparable people.

> There is no general agreement as to what constitutes the essential characteristics of a competent teacher. (Millman and Darling-Hammond, (1998 p. 197).

Testing

Testing is an educational tool that is sometimes referred to as an instrument. Regardless of the name, it can be justification for nearly everything that is done in education. Erwin (1991 p. 52)… gives another definition.

> An instrument or a test, in this context, is any systematic method for assessing students' learning or development.

In order to find the reason behind student achievement it is helpful to find out to what degree it exists, and in whom. While it is not the only way to assess the progress and development of students, testing is certainly one of the most common and widespread in use in education today. Opinions are mixed as to how much testing should be used and for what purposes those results should be used. Millman and Darling-Hammond (1998 p. 202-203)… shows an example of some of the down sides to testing.

> When too much stress is put on test scores – to the point that in St. Louis, teachers' evaluations depended on them – the temptation to cheat or teach directly to the test can be overwhelming, particularly when the same

version of a test is used year after year. Students end up learning primarily what is on the test, regardless of whether that is the best course of study. They also are shortchanged in the development of the kind of critical thinking and problem-solving skills that are essential for true learning but are not easily tested.

Standardized tests need not be banned, but their use should be reduced and put into the proper perspective. Not everyone needs to learn the same things in the same grade. Curriculum should be controlled locally, and schools whose courses are a little different should not have to suffer by comparison. Like all tools, tests can be used well or poorly. They are not designed to fix everything, and in the wrong hands, they can do more harm than good.

Testing is not the panacea, which will cure the ills of education. But it can help to identify what and where the greatest problems lie. It is a starting point, from which educators can build. Our current President has put forth testing in his education agenda. Millman (1997 p. 90)…reaffirms the results of testing to the nonbelievers.

Not all important outcomes of education are measured by tests (although many more than the detractors of testing imagine).

Testing may not be perfect for every child in every situation, but in the proper hands, and with the proper training, teachers can make them reliable over time. Millman (1997 p. 126)…feels testing holds a valuable place in educational evaluation.

> Standardized tests, either commercially available or locally developed at the behest of bureaucrats, are not outmoded and still provide accurate, reliable, and efficient measures of student achievement.

Accountability in education needs to be everyone's responsibility, from the student, to the teacher, and on up the ladder to the school and the whole district. Parents need to be involved in their children's education, to lend reassuring support, and demand what's best for, and from their children when justified. Millman (1997 p. 195)…lists some of the various reasons why and where accountability and incentive are best placed.

> If accountability rested solely on the shoulders of students, then schools would have positive incentive to meet only the needs of those students with whom it is easiest to work and whose parents are most likely to complain if their children do not get the lions share of the school's resources. If the level of accountability were the individual teacher, then there would be incentive for schools to become more concerned about which teachers get the better prepared students than about teaching all

students. Furthermore, there would be little incentive for teachers to work together. If the unit of accountability were the district, then there would be little opportunity for all staff to work together because physical distance and competing school-level activities would make it difficult to get together regularly.

Teachers should be given a voice, and a hand, in how instruments and programs are run and set up for them. This gives them an additional sense of ownership in the way classes and programs are created for their benefit and the continued success of all stakeholders involved. Millman and Darling-Hammond (1998 p. 191.)…Agree.

Rating instruments – and how they are used – should be largely controlled by teachers.

A case can be made for an effort to allow those who educate teachers, and even those who teach themselves, a say, if not a major role in their own Evaluation. No individual should know more about what takes place in the classroom than those who work in their own developed environment. In some cases this is already being done this way, or it is at least handled in an adversarial manner in some schools and districts. Millman and Darling-Hammond (1998 p. 200)…discuss how things have always been done in the past without outside advise or consultation.

> Teacher evaluation has usually been performed by administrators who typically developed the criteria and procedures for assessing teachers without consulting teachers, teacher educators, or citizens.

To begin any successful assessment of a class, program, school, or district, one must begin with clear and measurable goals and objectives. Millman (1997 p. 114)…feels that certain goals are being emphasized by teachers who have a feel for what is needed in today's curriculum.

> Across the country today, progressive educators are calling for greater attention in the curriculum to goals such as learning for conceptual understanding, the development of critical thinking skills, the capacity to apply knowledge to novel problems, and the ability to work in groups on complex learning tasks.

Evaluation may come in various forms, but the purposes remain the same for all types. It is however the means that can be different in all or any type. The definition of evaluation according to Berk (1981 p. 4)…

> The process of determining whether the objectives of a program have been achieved--- congruence between performance and objectives.

Evaluations are often mandated in schools and districts with poor track records, as motivation for improvement. Not only for accountability, but also for merit pay, student placement, and program feedback, to name a few. Berk (1981 p. 85)…feels that student learning is the key to determining the effects of programs.

> Change is certainly fundamental to any notion of learning, and determining the effects of programs on student learning is one of the most commonly stated purposes of mandated evaluations of educational programs.

Standards

Standards are like a high jump bar, which accurately measure only the weakest part of any performance or skill. They also allow one to set a minimum level of success. Millman (1997 p. 199)…feels that standards are important and necessary.

> Without standards, one could not make a judgement about whether a student is successful.

A standard gives us not only something to shoot for, but it also gives us something concrete to measure all other achievements against. If someone said they had climbed Mount Everest. We would know that they had not only

climbed a mountain, but that they had climbed the highest one in all the world. While other climbs could match Everest for any other skill, none could match it for total elevation. Millman (1997 p. 231)…

> Implicitly or explicitly, the standard is a manifestation of the value judgments inherent in determining if it is preferable to pass an examinee who deserves to fail or if it is preferable to fail an examinee who deserves to pass. Because no tests can be perfectly reliable or perfectly valid, such mistakes in classification will be made if people are to be split into passing and failing groups. When setting standards it is impossible to reduce one of the types of mistakes without increasing the other type.

Standards work best when they are well defined and measurable. It should be easy to understand, and very clearly defined. Tucker and Codding (1998 p. 46)…find fault with a large number of standards and the way they attempt to measure very abstract things.

> Far too many standards documents include statements like "The student shall develop an appreciation of literature," and far too few include statements along the lines of the New Standards requirement that students read twenty-five books a year. It is very hard to measure or even define "an appreciation of literature," and so it becomes a pious wish, but it is quite possible to create a book list and require students to read

> twenty-five items on that list. Students are unlikely to develop an appreciation of literature without reading some of it.

Standards are available nationally and in most states for most disciplines. Wisconsin has state standards for Technology Education and they can also be found nationally from the International Technology Education Association. Some groups, like Tucker and Codding (1998 p. 46) think it is very important how standards are constructed across the many disciplines.

> To be truly useful, the standards would have to be clear, specific, and expressed in a common framework across the disciplines. And they would have to reflect some hard choices as to what was most important in each discipline.

Evaluation which is based on standards may well become the future trend in educational assessment in this country.

Teachers are and will be held accountable for the results that come out of the classrooms they work in. Meanwhile students in these classes start out with very different levels of development. There are many causes for this including environment, maturity, attention span, and comprehension, just to name a few. But what really matters is not where that student begins on the learning scale, instead, we should be far more concerned with where they end up. Learning is

what we are really speaking of when Millman (1997 p. 11)…states that "Student learning is the stated objective of schooling."

Criteria

There are a series of criteria necessary to find and judge an instrument for assessment of students; teachers; programs; schools; districts; or even entire states for accountability. But fairness to all parties involved, would be the most important of all according to Millman (1997 p. 243)…

> Any method of evaluating teachers and schools with an eye toward making them accountable should be fair to the teachers and schools, should be comprehensive in terms of the types of learning objectives measured, should be competitive in relation to other methods of evaluating teachers and schools for an accountability purpose, and should not cause undesirable effects when used properly.

School districts look for more and better ways to evaluate teachers, programs, staffs, and inevitably, themselves. They need some type of criteria that is consistent, to build a foundation for an evaluation instrument upon. Millman (1997 p. 272)…believes that student learning is that proper foundation, above all others.

> To repeat, I believe that, now and in the future, student learning should be the most important criterion by which we evaluate teachers and school staffs.

Even more important is the difference between the level at which a student starts a class or program, and the level where that same student ends up improving to over that period of time. This value is what is known as learning gain. Millman (1997 p. 13)…feels that teachers will hold the most important role in the assessment of learning gains.

> Ultimately, the teachers' abilities---individually and collectively--- to assess learning gains will spell the success or failure of these bold reforms of elementary and secondary education.

Since the days of the one room schoolhouse, a true and accurate account of how effective the schoolmasters' job was accomplished, has no doubt usually eluded us as a nation and indeed a civilization. The blame for the past is to be shared by all those involved. But the credit can and should be shared in the future if all stakeholders will work together to implement a viable, working, solution to this problem in search of a solution.

> So schools have continued to offer curricula and teachers have continued to teach without establishing an appropriate defensible relationship

> between student learning gains and the performance of a teacher, the principal agent responsible for designing, delivering, and evaluating instruction. According to Millman (1997 p.14)

Teacher Work Sample Methodology

The past decade in the state of Oregon has seen several promising developments in education. A public education reform bill was passed with special help from several people. These include Vera Kratz, then speaker of the Oregon House of Representatives, now Mayor of Portland. John Kitzhaber, then Senate President, now governor, Phil Keisling, now secretary of state. As part of this reform formula Teacher Work Sample Methodology, (also known as TWSM) was introduced at Western Oregon State College. TWSM's or work samples consist of small units of study from classroom study. Using a pre and post test based on standards, goals, and objectives, teachers calculate and evaluate learning gains of each student in class. Millman (1997 p. 66)…likes the way the work samples are formed from a teacher's own work.

> TWSM yields measures of pupil learning that are close to a teacher's work and thus are meaningfully and defensibly reflective of a teacher's impact on student progress in learning.

The main emphasis is on student performance, learning gains, which should be the critical by-product of any productive teachers' career. Measuring

anything else, would come short of focusing on the core element of results. Millman feels, "it focuses teachers on pupil learning as the fundamental purpose and criterion of good teaching." (1997 p. 47).

This type of student evaluation may not be the only way to evaluate the performance of teachers in the classroom. However, most other methods have trouble presenting any greater scope of accurate information, from any other criteria than student learning gains. Millman (1997 p. 246)…gives this methodology a competitive chance against all others.

> Given that teacher assessment via student performance usually is not considered the sole indicator of teacher excellence and that no foolproof method of teacher evaluation exists, this method of teacher evaluation is competitive in relation to other methods.

It is this quantitative analysis of how students are doing in class, which will ultimately lead us to a proportional answer as to how teachers are doing in those same classes. Teachers in turn will be allowed credit for not only how, but how much, and why student's are learning, due to how things are taught in their classrooms. This could also bring newfound respect to a profession that has long been looked down on by many for generally unproven and unwarranted reasons. Experts like Millman (1997 p. 38)…thinks the methodology could give teachers just what they have always been looking for.

> Pupil learning is, always has been, and must continue to be the professional touchstone for teachers, and Teacher Work Sample Methodology provides a means for this linkage to be made meaningfully and defensibly. If viewed in this manner and extended to its limits, we believe the methodology carries with it the potential for lifting teaching to new heights as a profession and bringing with it the level of recognition teachers deserve and to which they have aspired for so long.

This methodology need not be purchased from a vendor like some high priced commodity. Instead, it can and should be created by the teacher who uses it. It can be created directly from the curriculum, through use of the goals and objectives of whatever sized unit it is used to evaluate. Therefore there is very little cost to anyone involved. According to Millman (1997 p. 66)…"TWSM includes information about the context in which teachers and students work and thus provides a fairer and more realistic picture of the effectiveness of a teacher."

The methodology is a good way for teachers to check the performance of a class or program themselves. Millman (1997 p.47)…Because "it is performance and outcome based, providing a real, personal, and integrative experience for teachers."

The methodology is based on all the things that teachers do on a regular basis. It takes goals and objectives and can also be used with standards to create

an instrument that measures performance. " It actually looks at teaching, and it does so in the context of teachers goals, classroom contexts, and student learning, measured in ways that link learning to the educational goals being sought." Millman (1997 p. 256)

It is both easy to set up, understand, and easy to use. As opposed to various other methodologies, which are much broader and more complicated than most jobs would demand. Some examples would be The Dallas Value-Added Accountability System, which would obviously be for a very large urban school district. Also The Kentucky Instructional Results Information System, and The Tennessee Value-Added Assessment system are both statewide and state-run instruments. While nearly all of these accountability systems may be effective for high stakes licensure or merit pay. However all are far too complicated for even the most qualified teacher to use and understand. And only TWSM when used properly, will improve both teaching, and learning at the same time. Millman (1997 p. 37)…say's, it is "user friendly." As indicated previously, however, the methodology requires a broad and reasonably high level of knowledge and skill for its application, but it can be argued that this is a level of knowledge and skill that all teachers and supervisors or administrators should have.

As you can see selecting an evaluation and assessment instrument for accountability in education contains many components. These should include

testing with standards that are based on defined and measurable goals and objectives. The criteria for these tests need to be based on what it is that we are evaluating for performance. These could include students; teachers; programs; schools; districts, and even states. Other criteria to be considered is how fair; reliable; accurate; efficient; consistent; comprehensive; accountable; and competitive the instrument is. If it is teacher accountability through student learning (gains) that is to be evaluated, then Teacher Work Sample Methodology will meet this criteria. The Western Oregon State College methodology would be a very good choice to meet these needs.

Chapter III. Methodology

Curriculum and Instruction

Following a review of the Wisconsin Model Academic Standards the investigator selected fourteen modules which include the following topics: Basic Electricity; Robots and Automation; Alternative Energy; Space Technology; Mechanisms; Plastics; Measuring-Tools/Safety; Lego-Technic; Badge-A-Minit; Computer Graphics; CB-Radio; AM-FM Listening; Robotics; and Problem Solving. The first five were purchased from a commercial vendor (Scantec), and the remaining nine were teacher-designed. The five purchased modules are five day experiences, while the remaining nine teacher prepared modules consist of two days of instruction. Classes are set up in a modular fashion, with the instructor providing a set of demonstrations on how to complete the modules that are spread throughout the room. Also taught, is the first two chapters from the book: Living With Technology by Michael Harker and Robert Barden.

Then, students are divided into groups of three, and follow a rotation through the modules. It should be noted that students were required to complete at least three of the five commercial modules, and at least six of the nine teacher-designed modules.

Students

The participants in the project consisted of six classes of sixth grade students. These classes consisted of a sampling of sixth graders, with about an

equal number of both boys and girls getting their first exposure to Technology Education. The classes were held the last three hours of the day (or seventh, eighth, and ninth hours) with class sizes between twenty one, and twenty seven total students.

Design of Testing Instrument

The instructor created a criterion referenced test based upon the Wisconsin Model Academic Standards in Technology Education. The test consisted of ten multiple-choice questions, with the pre and post-tests being identical. The test was also based upon a basic understanding of the discipline and various other concepts including measurement, and the major historic ages. These concepts are also contained within the Wisconsin State Standards, and were correlated with the instruction presented to the students.

Testing Procedures

Students were administered the pretest on the first day of the quarter, and prior to any instruction about Technology Education. The post-test, on the other hand, was administered within one of the last two days of the end of the quarter.

These classes were known only as sections 617; 618; 619; 627; 628; and 629. The pupils were anonymously put in a random numbered order for each class, from one to however many students were in each class. Only those students who were not present for one of the two tests were not evaluated. This consisted

of only three students total, who all were not present for the posttest. Of these, two moved away, and the other was absent due to an extended illness.

TWSM uses the pre and post-test to determine the Index of Pupil Growth, or IPG for any student, and or class. These tests, which are really the same test, contain information from any unit of study with the main emphasis of the Work Samples covering the goals, objectives, and standards, of that particular unit and discipline. Millman (1997)…

> This is done by calculating an Index of Pupil (IPG) score for each pupil. The IPG is a simple metric devised by Millman (1981) to show the percentage of potential growth each pupil actually achieved. The metric is calculated as follows:
>
> $$\frac{\text{(Post \% correct)} - \text{(Pre \% correct)}}{\text{(100\% - Pre \% correct)}}$$
>
> Multiplying this metric by 100 results in a score that can range from –100 to +100, where a negative number represents a lower score on the posttest than on the pretest, 0 represents no change from pre- to posttest, and +100 represents a perfect score on the posttest regardless of pretest performance. A negative score is rare, with most scores falling in the +30 to +80 range.

While this basic formula is not difficult to understand or use, it will only give information as accurately as it is fed. Millman (1997)…

> Ultimately, the teachers' abilities--- individually and collectively--- to assess learning gains will spell the success or failure of these bold reforms of elementary and secondary education.

While this TWSM is not perfect, it is highly praised by those in the educational field who develop evaluation instruments, test them, and regularly judge and compare them for a living. Millman (1997)…

> Ironically, TWSM, for all its limitations, is one of the best available teacher evaluation techniques.

If a teacher based evaluation is what the need is, one appropriate instrument to be considered should be Teacher Work Sample Methodologies used at Western Oregon State College.

Chapter IV. Analysis of Results

Analysis

The pre-post test data were analyzed using a procedure recommended by Millman (1997). The total number of questions correct out of the ten possible were listed for each pupil in columns two and three. The forth column consists of post – pretest in + or – numbers. The fifth column consists of 100% (or in this case it would always be 10) – pretest score. The sixth column is the Index of Pupil Growth (or IPG). Which once again is calculated by the following metric.

$$\frac{\text{(Post \% correct) – (Pre \% correct)}}{\text{(100\% - Pre \% correct)}} = \text{IPG}$$

The Index of Pupil Growth provides a percent of learning growth of students. This index has a value range between –100% to +100%.

Then the average % of IPG is figured by adding all the positive % for the class, and subtracting the negative % from the positive. Then, this total is divided by the total number of pupils in that class. Then, the total average % is found by adding each class average % and dividing by the total number of classes (which in this case would be 6).

Results

The average total IPG% for the respective classes in order were; 20.47; 3.91; 14.76; 15.87; 8.75; and 36.60%. The lowest class average was 3.91%, while the highest class average was 36.60%. The total average % IPG was 16.94%.

Chapter V. Conclusion and Recommendations

The results of the Work Samples would indicate that all classes had a positive net learning gain average. With two thirds of the classes averaging well above double figures. One third exceeded twenty percent, and one class even exceeded thirty five percent. While Millman is not very specific as to what he considers an acceptable level of pupil growth, or learning gain, he does list some of the factors that effect this level. Millman (1997)…

> Other factors such as pupils' prior knowledge, socioeconomic status, student language proficiency, classroom resources, and the like also can influence pupil learning gains.

As a teacher my concern is not only how the class as a whole performed, but how well each student performed. It can be very important as to just how well any individual student does on the pre-test in determining how much opportunity that same student will have to improve on the posttest. Berk (1981)…

> Thus, in an evaluation study where comparisons are made of the gains achieved by two groups that differ in pretest performance, the initially lower scoring group has a built-in advantage.

Individual differences among the performance of students in each class is a constant point of reflection that a teacher needs to monitor and understand the reasoning or cause of such differences. Why did one class perform three times as well as another. But more importantly, what was the cause? Was it the teaching? Was it the curriculum differences in the two classes? Could it be the time of day? What are the variables causing any student not to do his very best on any given test? Berk (1981)…

> Measures of educational outcomes are typically classified as measures of maximal (as opposed to typical) performance. That is, we want students to perform their very best --- to perform near the upper limits of their skills and abilities. Any factors that produce less than maximal performance will affect test scores. Factors of special concern to evaluators include general motivation, test anxiety, and familiarity with the testing process. The latter two factors are of general concern in test use and usual procedures to familiarize students with the form of the test, to teach test-taking skills, and to reduce undue anxiety are part of the recommended standard testing procedure for many tests. (One shouldn't assume, however, that this is going to be done routinely.)
>
> Motivation is also a concern of typical test users, but it may be especially important in evaluation studies since how well students perform does not directly affect the students themselves---it affects

directly only the program being evaluated. There is a suspicion afoot that some evaluation studies may be affected by unmotivated students exhibiting forms of behavior that negatively affect the evaluation results, such as filling in answer sheets without reading test questions. All the factors affecting maximal performance, especially student motivation, deserve the attention of the evaluator.

Teachers need to establish their own personal guides as reflected in the performance of the students. Most teachers would agree that any learning gains over ten percent would be at least acceptable. In this study, 57% of all students exceeded this standard, with 20% showing no change at all, and 22% showing a negative change of some degree. In one class 76% of the students exceeded the 10% standard, and two classes exceeded 70%.

While the study has shown a degree of success, the focus of the teacher is on those students and classes who did not demonstrate success, and the reasons for the sub par results. Never allow students to have a period of free time after they finish the test. This allows students to hurry through the test and therefore not give their very best effort. 8th hour clearly performed the worst, which is from about 1:55 till 2:40PM. I have noticed that this seems to be a very sluggish time of day after lunch has been digested. But also I am aware that this group contains the largest number of special education students. Neither class this hour even reached double figures in average IPG%. While all other classes and

all other hours of the day exceeded the 10% increase by far (at least 4.76%). 9th hour had the best scores by far. This could be equated to a "great awakening" over the previous hours results. These results are encouraging, but they show room for vast improvement, from all involved.

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